HAER No. NV-8

East Verdi Bridge
State Route 425 spanning Truckee River
Verdi
Washoe County
Nevada

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16-VER,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service, Western Region
Department of the Interior
San Francisco, California 94102

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HISTORIC AMERICAN ENGINEERING RECORD

EAST VERDI BRIDGE HAER No. NV-8

Location: B-378, State Route 425 spanning the Truckee River
1.75 miles west of the east junction of I-80 and SR-425
Verdi, Washoe County, Nevada

U.S.G.S. 7.5 minute Verdi, Nevada, quadrangle,
Universal Transverse Mercator coordinates:
11.244800.4379000

Date of Construction: B-378, 1938-1939

Engineer: George Egan, Nevada Highway Department

Builder: Isbell Construction Company, Reno, Nevada
Nevada Rock and Sand Co. Inc., Reno, Nevada

Present Owner: Nevada Department of Transportation
1263 South Stewart Street, Carson City, Nevada 89712

Present Use: Vehicular Bridge

Significance: The East Verdi River Bridge is one of only two examples of single span concrete arch-thru bridges in Nevada. This type of structure has been rarely used in this state. Given the complexity of design and construction several other types of structures were in wide use that would have spanned the Truckee in a more cost effective fashion. The open arch design is aesthetically pleasing and integrates well with the environment. The concrete balustrade is a blend of art deco and classical design elements. This bridge was a vital crossing point along old US-40, the first transcontinental highway.

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HISTORICAL NARRATIVE - VERDI RIVER BRIDGES

DESCRIPTION

The East/West Verdi River Bridges (N.D.O.T. numbers B-378 and B-380) share the same Arch-thru design. They differ only slightly in the curve of the main arch and the length of the approaches. The essential design element of the bridges are the parallel twin arches spanning the Truckee River. In both cases the arches are on 100' centers at the footings. The main difference between the bridges is that the curve of the arch on B-378 is 20' above the center of the footing base and this is only 16' in the case of B-380. The arches are of concrete with reinforced steel cores.

Each arch is tied together with two horizontal stringers at a third distance of the corve. Rising vertical to the floorbeams and deck are ten pairs of columns on 11'9" centers. The approaches on B-378 are 48', for a 96' total, and the entire structure is 205' in length. The approaches on B-380 are 36', for a 72' total, and the entire structure is 184' in length.

Both bridges are 32' wide at the outer edge of the rails. The superstructure accommodates two 13' lanes and each bridge has a 3' wide walkway/rail on each side. The road surface consists of 10" of concrete with asphalt over the original pour. The balustrade is of reinforced concrete with a blend of art deco and classical design elements. The rail ends feature a treatment in which a quarter ellipse and a circle on a 2' radius gracefully curve to meet a massive tapered column. From this art deco treatment the rail features 10" wide classical open arches with a rail cap 10" in cross section. The rail from the road surface is slightly over 3'7" in height.

CONSTRUCTION

The contracts for both East/West Verdi River Bridges were won by the same company: the Isbell Construction Company, 1300 East Fourth Street, Reno, Nevada. Contract #557, awarded on June 24, 1938, was for $273,691.96. The contract amount included the construction of 5.216 miles of road in addition to the East Verdi River Bridge, B-378. Work on this project started on September 30, 1938 and ended on June 22, 1939. While Isbell Construction Company was the prime contractor on the project, the actual construction of the bridge was sub-contracted to Nevada Rock and Sand Co., Inc., 307 Morrill Ave., Reno, Nevada. The sub-contract paid Nevada Rock and Sand Co., Inc. a total of $37,942.00 for work on the bridge.

In the case of the West Verdi River Bridge, B-380, the records are incomplete as to the date Isbell Construction Company won contract #568. Indications are that the contract was let near the end of 1938. The contract was for $115,734.95 and this included a .927 mile section of road in addition to the bridge. For its work on constructing B-380, Nevada Rock and Sand Co., Inc., again sub-contracting the bridge construction, was paid $35,436.65. The sub-contract was finalized on March 1, 1939 and the bridge was completed by September 18, 1939.

The East/West Verdi River Bridges were constructed over a period of one year, from the fall of 1938 to the end of summer 1939. The most important part of the construction of these bridges was completed in the winter months of 1938-39. In both cases construction over the winter was used to facilitate the completion of footings, falseworks and arches during the low water months. As an example, the intersection of the base of the arch and the footing on B-378 is at an altitude of 4797' A.S.L. There is a 20' rise from this point to the bottom of the arch and flood waters had risen 11' to 4808' in 1937. At this water level work to construct a bridge could not have been accomplished. Fortunately, the winter of 1938-39 was reported in construction notes to have been normal: cold, light snow in Verdi, and no floods.

It is interesting to note the quantities of materials that went into the construction of the East/West Verdi River Bridges. The structures, because of type, contain two materials, concrete and steel. In addition, bronze is used as bearing caps and large amounts of wood are used to construct the falseworks. Finally, the excavation and backfilling of bridge approaches, coffer dams and access roads account for a large movement of dirt. Below is a table containing quantities of materials and work that went into B-378 and B-380.

ESTIMATED MATERIALS AND WORK B-378 AND B-380

	B-378	B-380
Concrete, All Types	740 yds	788 yds
Reinforcing Steel	160,800 lbs	170,686 lbs
Bronze Bearing Caps	1184 lbs	1015 lbs
Excavation and Backfill	1757 yds	1956 yds
Construction of Rail	387 linear ft	339.5 linear ft

From notes in the files we have a construction sequence for the East Verdi River Bridge, B-378. The way this bridge was built is representative of B-380.

The sub-contract with Nevada Rock and Sand, to construct B-378, was signed in late September of 1938. Contracts for materials were placed in the fall and certifications of steel and bearings caps were obtained in time for construction. The reinforcing steel was purchased from the Columbia Steel Company of San Francisco, California. M. Greenberg's and Sons supplied the bronze bearing plates. The Mertensen Construction Company and the Robert W. Hunt Company performed tests on the steel and bearing plates. All of these companies were located in the San Francisco Bay area.

By December 23, 1938 coffer dams had been dug around the east/west footings. The west footing had been poured and pumping of the east footing work area was under way. The river is reported as low and channeled to a narrow gap between

the work areas. The original structure, for this section of US-40, was still in use as B-378 was built on a new alignment. On December 28, 1938 the east footing work area was dry and forms were being erected. Work on the west approach was under way with excavation being carried out with a motor shovel.

In early January 1939 the footings for both arches were complete. Two columns for the west approach deck were up and work was underway on the remaining columns. One month later on February 8, 1939 the columns for both approaches were up. The forms for the west approach deck and floorbeams were 75% complete. At this time work on the falsework for both arches was about 90% complete. In order to build this falsework piles were placed in the river channel, protected by small coffer dams, under the arch location. Wood beams tied each set of piles together and the river was spanned by 38' steel "I" beams. The complex arch falseworks was built on top of the square pilings/beams that spanned the river.

In construction of an arch a specific pouring sequence must be followed in order to obtain maximum strength. The pouring sequence for the arches on B-378 and B-380 is as follows. The plans state "Cure concrete in any section of arch rib at least three days before pouring adjacent section". First in the sequence is the construction of the footings. When the arch falsework is in place the very top of the arch is poured first, followed by the sections attaching to the footings. A small "key", at the 10 and 2 position, joins the base and top of each arch after the three day curing time. The arch is complete at this point and the columns are the poured and cured. The outer thirds of the deck/floorbeams are poured before the center section, and the structure is complete except for railing.

Notes from March 20, 1939 indicate that 60% of the time allotted for construction of B-378 had passed. At this point it was estimated that 64% of the work was done. The arch had been poured and the columns were being erected. The west approach deck was finished, allowing better access to the center of the structure. The east approach deck was being poured. The final sequence of events would have included finishing the approaches, deck over the arch and the railing. A final note in the files indicates that on June 19, 1939 bridge was complete and the forms for the railings were being pulled. All that would have been left at this point was backfilling around the structure, construction of the approach road and site cleanup.

PEOPLE AND CONTRACTORS INVOLVED WITH B-378 AND B-380

The construction of B-378 and B-380 was part of the ongoing upgrading of bridges and roads in Nevada. The years from 1936 to 1938 were a time of major bridge building activity for the Nevada Highway Department. In this time 72 structures were completed and numerous miles of highways upgraded.

The engineer in charge of the design of the two structures was Mr. George Egan. In 1932 Mr. Egan was in charge of the design of B-81, a thru "pony" truss structure in Clark County that was the subject of a HAER Recording by

this department in 1985. At that time the State Highway Engineer was Mr. S. C. Durkee. However in 1938 Mr. Robert A. Allen headed the Nevada Highway Department.

The Resident Engineer (R.E.) for both bridge construction projects was Mr. Dan Indermuhl. Mr. Indermuhl was experienced at overseeing the construction of bridges. He first appears in the records in 1931 as R.E. on several bridge contracts in Clark County. Among his projects were two structures built over the Virgin River near Mesquite and Bunkerville. These bridges, B-85 and B-89, are the longest in the state at 854' and 954' respectively. A search of the records indicates that Mr. Indermuhl continued as a R.E. in northern Nevada until 1942. After this point he may have left state service for the military.

The Isbell Construction Company of Reno, Nevada first won a highway contract on July 23, 1924. This project was for grading of road from 2 miles east of Verdi to the California border. They were paid $139,131.42 for this work and the project lasted over two years. A final contract, #1202, was awarded to the company in May of 1965 for an overlay in downtown Reno. This job paid $331,794.00. In the 41 years that Isbell Construction Company appears in the records they performed tens of millions of dollars of highway work. They won 5.6% of the contracts let between those years.

Like the Isbell Construction Company, Nevada Rock and Sand Co. Inc., was a major contractor on state highway projects. On June 2, 1926 they were awarded a contract of $39,160.45 for putting gravel on 7.57 miles of road near Sparks, Nevada. During the next 17 years Nevada Rock and Sand won 45 contracts, 9% of the total of all contracts let by the department. This total does not count the two sub-contracts for the construction of B-378 and B-380. The last contract awarded to the company was in Battle Mountain, Lander County for a 9300' airport runway. This August 1943 contract was undoubtedly tied to the war effort as no civilian aircraft of the day required this length runway. For the airport project Nevada Rock and Sand was paid $345,810.40.

Both of the companies involved in the construction of B-378 and B-380 were among the most successfull in early road building in Nevada. Like the Isbell Construction Company, Nevada Rock and Sand is no longer in business.

EVENTS ASSOCIATED WITH THE CONSTRUCTION OF B-378 AND B-380

The most interesting aspect of the construction of the East/West Verdi River Bridges was the labor trouble associated with construction. During the late 1930's the country was still in the midst of the "Great Depression." This was also a time of growth in the labor union movement. The organization of unions in the construction industry was often violent and hard won. The climate in the state of Nevada was very hostile to union organization at this time. Even today Nevada is a "right to work" state.

In essence, the labor trouble during the construction of the bridges revolved around union organization of Isbell Construction and Nevada Rock and Sand

employees. An article in the Reno Evening Gazette of September 26, 1940 and notes from the files allow for a reconstruction of events. The problem involved the establishment of a "company" union, The Highway Workers' Federation by the Isbell Construction Company. The construction company refused to bargain with the American Federation of Labor (AFL) Teamsters union over organization of workers and wages. A specific worker, Mr. Albert Smith, was apparently fired over his union activities.

As a result of these problems, the Congress of Industrial Organizations (CIO) sent some 300 men from California to protest Isbell activities in October of 1938. At this time the company would have been working on the road between Lawton's Springs and Verdi and work on B-378 was just getting underway. The paper states that "the construction company organized a group of armed vigilantes and had them deputized to repel and resist a unit of the CIO which attempted to come into Nevada..." Further along in the same article the paper states "a posse organized by the Washoe County Sheriff in October of 1938, formed at Verdi and resisted a threatened "invasion" of some 300 CIO workers who were en route to the scene of the highway construction project..."

The threat of a labor action against Isbell Construction must have been common knowledge in early October 1938. In the files there is a letter from Mr. J. L. Hancock, the Division Two Engineer for the highway department, to the R.E. Mr. Indermuhl. This letter, dated October 8, 1938, warns of a "rumored" job action by the CIO and tells Mr. Indermuhl to keep a diary on the situation. He is also cautioned not to discuss the subject or express an opinion about any actions that take place. The threatened "invasion" by the CIO took place on October 8, 1938 and they succeeded in shutting down the job site for that day. Mr. Indermuhl kept records of work stoppages during the course of the project. He states that this day was lost to "labor trouble."

As a result of the October 8th, 1938 problems local members of the AFL Teamsters Union set up a picket line on both ends of the road to B-378. On November 17, 18, 19, 21 and 22, 1938 the line forced serious work slow downs at the job site. The records show that union drivers refused to cross the picket line to deliver cement. Because the contract for work with the state carried a penalty for being late, Mr. C. V. Isbell requested an extension of time for completion of the project. He made this request to Mr. Robert A. Allen, State Highway Engineer, on November 29, 1938. Mr. Allen denied the request of a time extension on December 8, 1938. He reasoned that the delay was a very small part of the total allotted time to complete the contract. In the end work progressed at a good pace and the entire project was finished within the specified limit.

Because of trouble at the job site the Reno Building Trades Council filed an action against Isbell Construction with the National Labor Relations Board. A ruling against Isbell Construction came in September 1940. It held, in a first of its kind ruling, that "road contractors engaged in construction of interstate highways fall within the jurisdiction of the Wagner Act". As a result Isbell Construction was ordered to "disestablish the Highway Workers'

Federation as a collective agency; to reinstate one worker, Albert Smith, with $50 back pay, and to cease "urging, persuading or warning its employees" to refrain from joining the AFL Teamsters' union."

The ruling against Isbell Construction apparently had far reaching implications in labor law as it applied to Federally funded projects. Mr. Allen, State Highway Engineer, wrote the National Labor Relations Board for copies of the ruling in August of 1941. He stated that the ruling would be a matter of discussion at the annual convention of the American Association of State Highway Officials in Detroit. The board indicated that as far as it new, in late 1941, the Isbell case was still the only one of its type on record. It is of interest to note that Nevada contracted to build two of its most beautiful structures in the winter of 1938-39. At the time B-378 and B-380 took shape a drama of the American labor movement was being played out around the construction site.

TECHNOLOGY AND DESIGN

There is no record of the reasons for the particular design of the East/West Verdi River Bridges. A number of bridge types, less aesthetically pleasing, could have been constructed across the Truckee River. From an engineering standpoint concrete "slab" or "tee beam" bridges would have worked just as well at the location. These types would not have required the construction of the very complex falsework needed to pour the arch. In addition, given that the base of each arch is only 100' at the footings, the arch and columns are in the river channel at high water. On numerous occasions since 1939 flood waters have piled up tons of rubble in the footings of each structure.

While no definitive answer can be given for the reason a "thru-arch" design was chosen for the bridges, three points of speculation are plausible. At the time of construction B-378 and B-380 were on US-40, the Victory Highway, and the prime east-west route across America. This road was also the most important highway to run through Nevada in the late 30's. As the premiere road in Nevada, it is logical that the department would have invested its most significant engineering efforts in bridges along this highway. The evidence indicates that these types of bridges were only built at Verdi.

As the Nevada Highway Department was a young institution in the 1930's it is possible that the bridges represent "individual" design initiative. Often one of the most significant characteristics a young organization is innovation in design and technology. This would serve to stretch the capabilities of the bridge engineering division and build technical sophistication.

Finally, there is an element of continuity in the design of B-378 and B-380. The original bridges that were replaced in 1938-39 were built under contract #125 in 1925. These bridges are listed in the records as being "arch bridges." A continuity, and improvement, over the original design could have been a significant factor in the type of structures built as replacements.

It may be that all of the reasons mentioned above played a role in the design of the Verdi River Bridges. The results of the Department's work is unique. The bridges are of a complex design type that blend perfectly with the mountains, forested valley and Truckee River. The East/West Verdi River Bridges symbolize the increasing engineering sophistication of a small highway department in an arid state. Located on Nevada's major 1930's highway, the East/West Verdi River Bridges were a beautiful statement to travelers, as they entered or left the state for California.

HISTORICAL BACKGROUND

The area in and around Verdi has been important to transportation since the mid 1800's. Verdi is at the head of a narrowing canyon that branched to a variety of alternate trails into California. The area was first known as "O'Niels Crossing" after a man who built a bridge across the Truckee River in 1860. With the arrival of the Central Pacific Railroad, later in that decade, the small village that had sprung up was renamed. The railroad choose to name the town in honor of "Giusseppe Verdi" the Italian opera composer.

In November of 1869 a Post Office had been established in the town. Because of its location on the CPRR, and the surrounding forest, a thriving lumber industry developed. On November 4, 1870 the CPRR #1 train was robbed at Verdi of its payroll for the Yellow Jacket Mine on the Comstock. All of the bandits were later captured and sent to prison for long stretches.

In the 1900's, with the advent of the motor car, the route from San Francisco through Reno and on to the east became important. By and large this early route followed the rail lines. In 1903 Dr. H. Nelson, Mr. Sewell K. Crocker and a bulldog named "Bud" drove a Winton motor car from San Francisco to New York. The trip of over six thousand miles took 64 days and was a major adventure of the day. A likely route would have taken the pair through the Verdi area.

In 1938 when B-378 and B-380 were constructed a major realignment of US-40 was undertaken. The files of the Nevada Highway Department are thick with paperwork for the acquisition of new right-of-way. In short, the original core of the town of Verdi was too tightly clustered along the original route to widen the road. For safety reasons the new road went around the town center to the north. A number of properties were purchased and buildings relocated. The central business district of Verdi today is on the new alignment.

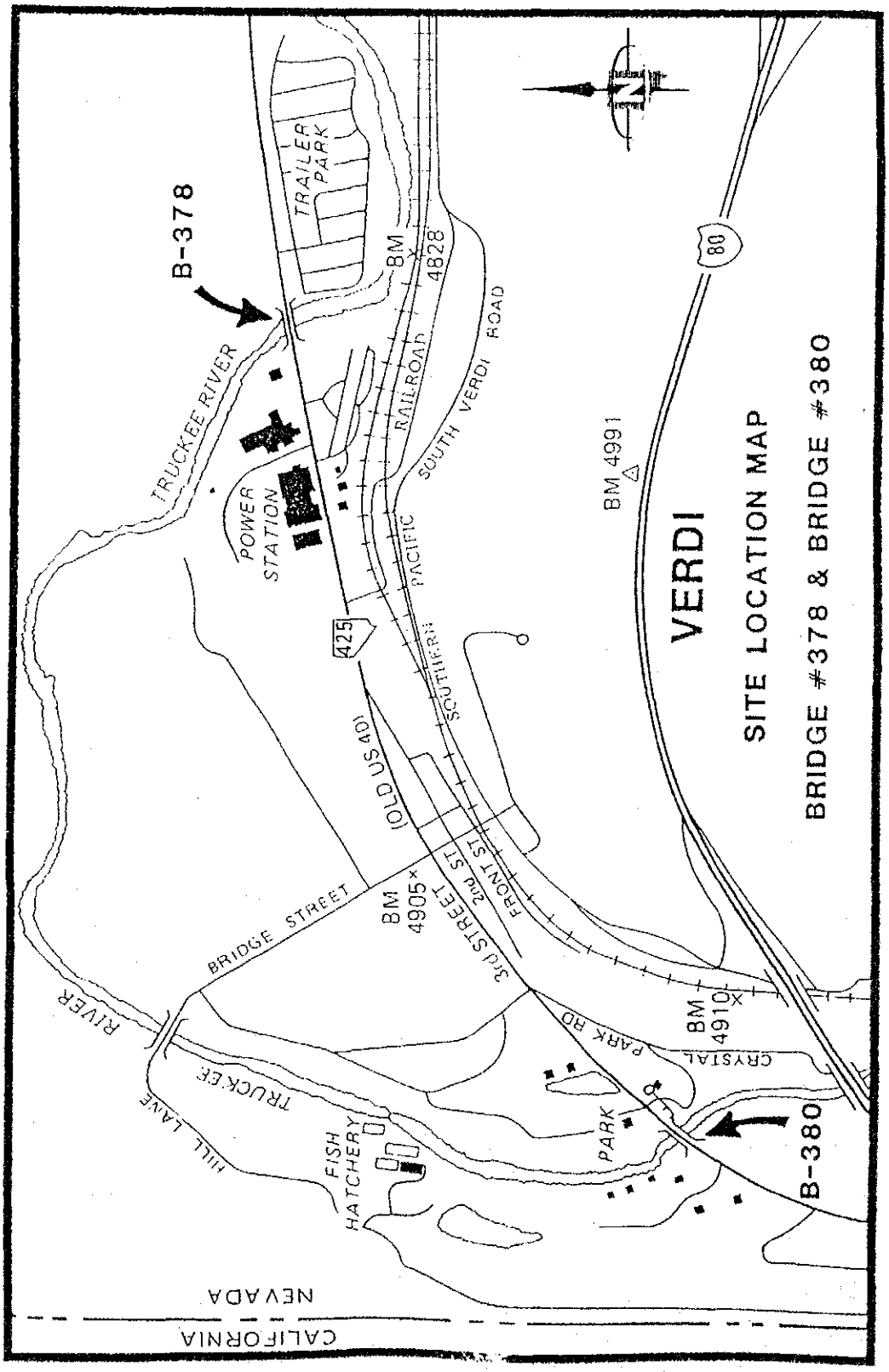
In the sixties, with the construction of the interstate, Verdi was bypassed for good. The main route of I-80 was moved to the hill south of town. Today the area is a tourist stop in the Sierras and a bedroom community for Reno. The graceful arches of B-378 are now best viewed from a mobile home park and a business complex. On either side of B-380 expensive homes and a small park are now found. The old bridges across the Truckee are somewhat in disrepair in 1989. Built in the heat of labor confrontation, they have withstood the yearly Sierra winter and spring floods, fifty years later they still provide an important service to area residents.

HISTORICAL CHANGES

Throughout the life of the Verdi Bridges only normal maintenance has taken place. Today the bridges are essentially the same as when they were built.

PLANNED CHANGES

The structures are to be widened and strengthened to meet current codes and traffic requirements. The existing arch ribs will remain in place. New arch ribs will be cast as additions to these existing ribs. Footings will be strengthened and enlarged. The superstructure will be replaced, maintaining a similar appearance to the existing superstructure. Architectural treatment will be used on the parapet facia to resemble existing, but deficient parapet rails. All concrete form work will be mounted on the existing arch ribs to avoid working in the river.


SITE LOCATION MAP
BRIDGE #378 & BRIDGE #380
VERDI
B-378
B-380
TRUCKEE RIVER
TRAILER PARK
BM 4828
RAILROAD
SOUTH VERDI ROAD
POWER STATION
PACIFIC
SOUTHERN
425
OLD US 40
BM 4991
80
BM 4905
BRIDGE STREET
2nd STREET
3rd STREET
FRONT ST.
BM 4910
CRYSTAL
PARK RD
PARK
FISH HATCHERY
HILL LANE
TRUCKEE
RIVER
NEVADA
CALIFORNIA

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